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ABSTRACT

A Community Thinkers' Tournament uses existing communications and instructional gaming technology to make available to participating community members a learning network for enhancing fundamental reasoning skills. Experience with this program, as it has operated in Ann Arbor, Michigan and the Watts area of Los Angeles over a two-year period, shows the potentialities of learning networks for complementing the educational activities of schools. Participants call each other on the telephone and play any of the current games. They can also form into teams with the winning team honored on a weekly basis. It is expected that it will shortly be possible to introduce the computer into these learning networks and further increase their educational potential. (Author/STS)

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COMMUNITY THINKERS' TOURNAMENTS FOR COORDINATING OTHER COMMUNITY RESOURCES TO COMPLEMENT THE EDUCATIONAL FUNCTION OF SCHOOLS

by

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INTRODUCTION

A Community Thinkers' Tournament uses existing communications and instructional gaming technology to coordinate local resources and make available a learning network for enhancing the fundamental reasoning skills of anybody in the community who wishes to participate. The brief experience of the Community Thinkers' Tournament as it has operated in Ann Arbor, Michigan, and the Watts area of Los Angeles during the past two years shows the potentialities of such efforts for supporting and complementing the educational activities of schools. But even more promising are developments on the horizon for bringing computers into these learning networks. What will be the intellectual impact of having available in one's own home, delivered inexpensively over the telephone, a high-powered, computer-managed learning program in logic, mathematics, scientific reasoning, or language structure? Implementation in selected communities in the United States is just around the corner, and availability in urban centers around the world and wherever else modern communication facilities are available will also soon be possible.

Imagine young Mary Ellen Ferko (See Appendix A), or any other interested and interesting person who comes to mind, huddled over the kitchen table in the congenial setting of her own home, phone coupled to her ear with one hand, and the other busy writing mathematical expressions on a piece of paper. Obviously engrossed in a dialogue that is both challenging and fun (and even a bit surreptitious) her occasional peals of laughter are punctuated by blowing into a pitch-pipe and sending tones into the phone -- and then more writing and figuring. She is one of hundreds (or thousands) of persons in X community, bent on improving their basic reasoning skills, who can have the opportunity to do so with a simple charge-free dial of the phone. If one listened in on an extension, the Froggie voice of the computer croaking out mysterious messages would soon be discovered by a discerning ear to be the opponent (teacher really!) with whom Mary Ellen is playing an exciting match of the instructional game of EQUATIONS. What is it that she finds so stimulating? It very well might be a problem of the type illustrated by the following question:

> Is it possible to order and group some (or all) of the following characters to form an expression equal to 11?
> 1 5 7 9 x - - (( ))

If Mary Ellen with her pitch-pipe, in effect, says, "No," to the Froggie voice at the other end of the telephone line, the computer program there attached will guide her through a carefully-sequenced lesson in the subtraction of negative numbers, teaching her in the process why the correct answer above is "Yes" and how to use that idea in the next game of EQUATIONS that she plays with a live human opponent in the classroom or in the Community Thinkers' Tournament in her town.

Demonstration of the practical usefulness of the type of learning environment described is currently being undertaken in Ann Arbor and Flint, Michigan. The operating demonstration model of such a learning network will have the following features:

1. has available a carefully-sequenced and highly-sophisticated instructional program managed by a time-sharing computer system;
2. available free of charge to any person in the community who has access to a telephone (touch-tone or ordinary dial) at a cost to the sponsoring institution that is relatively inexpensive;
3. deliverable over the phone to learners in the comfort of their own homes;
4. capable of delivering instructional programs with demonstrated effectiveness for enhancing fundamental intellectual skills in logic, mathematics, scientific reasoning, and language structure;
5. replicable in every community throughout the nation interested in upgrading the quality of thinking available for dealing with problems encountered there;
6. utilizes existing community communication resources to enhance the educational opportunities available (local schools, banks, newspapers, television, telephone and computer systems);
7. emphasizes individualized and peer learning by maximizing the use of existing human resources in conjunction with the computer-aided instructional program to facilitate the generation of problems at the appropriate level of difficulty for each individual learner in the community;
8. takes advantage of the extraordinary motivating qualities of instructional gaming to encourage the voluntary participation of those who might not otherwise seek out intellectual pursuits; and
9. possesses the capability for novel and innovative methods for certifying competence in the achievement of fundamental reasoning skills (demonstrated ability to do specified reasoning tasks rather than mere successful completion of "courses").

The professional and mass literatures abound with critiques of present educational practices and systems and materials; these critiques offer various, sometimes conflicting, palliatives and correctives, based as they are on disparate educational philosophies and objectives. In developing new teaching media during recent years, some educators have tried to utilize the fun, the ego-enhancement, the challenge of games as a medium for academic subject matter, thereby attempting to fulfill the "both" of the Horatian precept "to delight, or instruct, or both." Teaching that both delights and instructs can transform the learning process and, therefore, the learner's attitudes toward himself, his capacities, and what it is to learn and to know. Moreover, in the discovery process of the game situation, emphasis is shifted from teaching to learning, from teacher to learner. Motivation and reinforcement are embedded in the game structure and its subject matter rather than being imposed from without in the form of praise, grades, and other teacher-centered rewards. Learning becomes an active pursuit, immediately important.

The instructional games used in the Community Thinkers' Tournaments are <u>nonsimulation</u> games -- that is, the players of these games are <u>doing</u> the subject matter of that game, not some simulation of that subject matter. The player of EQUATIONS is doing mathematics; the player of ON-SETS, doing set theory; of WFF 'N PROOF, mathematical logic. In making moves in these resource-allocation games the players are constructing problems for each other in the subject matters dealt with by the games in the same way that players of chess or checkers are posing problems for each other by their moves. The games are in essence, a vehicle for generating interesting problems (ones at the appropriate level of difficulty)

for those participating. These games all have the same general format: the first player sets a goal, and then the players take turns allocating the remaining resources in such a way as to place appropriate limitations on the use of the resources in constructing a solution to the goal posed. Play continues with players alternating moves until someone challenges or declares a "force-out" thereby imposing upon somebody the burden of proving that a solution is still possible under the limitations imposed by the moves made.

Studies of the effects of these classroom instructional gaming programs show that they have a profound impact upon attitude, aptitude, and achievement. Using school absenteeism as an indicator of motivation, a full-year study in an inner-city Detroit school indicates a drop in absenteeism in instructional gaming classes to one-third the level that occurs otherwise in corresponding classes.[1] To the extent that I.Q. scores are indicators of aptitudes, participating in these instructional games can even affect aptitudes; increases of more than 20 points on nonverbal scores on standard I.Q. tests have accompanied short intensive exposures to these games.[2] More significant, perhaps, is the doubling of achievement scores in mathematics that have resulted from engaging in these instructional gaming activities.[3]

The Community Thinkers' Tournament was started in Ann Arbor in the fall of 1975 with a grant from the John and Mary Markle Foundation. More than 500 persons, mostly youngsters and a sprinkling of parents and other adults, enrolled and participated in the community-wide tournament during its inaugural year. Participants played their choice of five games over the telephone and reported matches to the tournament staff, who summarized the results of the weekly tournament and distributed accounts of the play by cable television, by newsletter, by the local newspaper, and by bulletin boards in the schools, the local bank, and other community organizations. The Community Thinkers' Tournament has continued during this past year in Ann Arbor, and an adaptation of it has continued in the Watts area of Los Angeles under the sponsorship of the Fund for the Improvement of Postsecondary Education.

There are three general components of a Community Thinkers' Tournament -- two existing and the third envisioned: the classroom component, the telephone component, and the proposed computer-aided instructional gaming component to extend and enhance the effects of the other two.

THE CLASSROOM TOURNAMENT

Although the instructional value of these resource-allocation nonsimulation games, and the pleasure to be derived from playing them, are sufficient to warrant their casual use both in and outside the classroom, their full educational -- even social -- potential are, perhaps, best realized in a tournament and team structure which has been designed for classroom and extracurricular use. The resulting peer group interaction provides a careful balance of cooperation, competition, and fun in order to motivate students to a greater interest in and attention to fundamental reasoning skills. Within this setting, competition has the positive aspects of challenging engagement without the negative implications of threat.

To conduct a classroom tournament, a teacher roughly ranks the students on the basis of his knowledge of their prior performance in class. The three most "competent" students play initially at table 1; the next most "competent," at table 2; and so forth. Thus a class of 30 students is divided into a hierarchy of 10 playing groups each playing at a different table. At the same time, the teacher assigns each student to a four- or five-member team, each of the six teams in the class as heterogeneously constituted and as evenly matched with the other teams as possible.

Team members' individual scores are aggregated to determine the team score. It should be especially noted that an individual at table 10 can achieve for himself, and contribute to his team, just as much as can the individual at table 1. Perhaps more importantly, experience with this team structuring has demonstrated that members of a team in such a structure are motivated to teach and learn from each other. For this reason, the most important element in a teacher's assigning students to teams is that each team contain at least one strong player. The learning situation is so structured that this player will endeavor to pass along his knowledge and skill to his teammates. Thus the peer-learning embedded in the games themselves is expanded by the tournament and team structure.

The plays of a game that occur during a classroom period constitute a round of play. After the first round of play, high scorers move up one table (except at table 1); low scorers move down one table (except at the lowest table); and players with the middle scores remain at the same table. In this dynamic learning environment, winners are moving into more sophisticated games; losers, to less sophisticated ones. But most significantly, the tournament rules for table moves structure the outcomes so that every player will get his fair share of wins and losses in terms of game outcomes. In the long run each player wins about one-third of the time, loses one-third of the time, and winds up in the middle one-third of the time. Further, the game rules for imposing the burden of proof assure for every player in every match a strong likelihood of either winning or learning.

Certainly, in such a tournament honor and status are attached to playing at table 1. Thus students strive to improve their knowledge and skill in order to play as near the top as they can. But experience indicates that this tournament design provides abundant rewards and incentives to the students in terms of their individual performances in whatever game they are playing, whether at a high table or a low table. Players are vastly more concerned with how well they do wherever they are playing, than with the table at which they are playing.

In the scoring method that is used, the player at the lowest table gains as many points for a win as the player at the highest table does, and they contribute equally to their teams' performances. Thus <u>improvement</u>, rather than rank, is encouraged and rewarded.

After each playing session, a Newsletter (preferably prepared by the students themselves) reports tournament standings and game strategies along with individual and team accomplishments and other matters of interest. The Newsletter is a crucially important means for communicating such recognition and furthering interest in the tournaments.

To an alarming extent, academic pursuits seem to many students to lack any connection with activities, interests, and human relationships outside the classroom. Instructional games can contribute opportunities for personal interaction with intellectual challenge in the exploration and doing of academic subject matter. These games tournaments, extended from the classroom and school into interscholastic play, can provide an intellectual parallel to the athletic competition which elicits so much attention, involvement, and enthusiasm of students. If appropriately managed, such tournaments can involve a wide spectrum of students from every level of capability and achievement.

THE TELEPHONE TOURNAMENT

Play in the weekly Community Thinkers' Tournament begins on Monday morning and continues through Sunday night of that same week. Participants call each other by phone and play any of the five games that are currently included in the tournament (EQUATIONS: The Game of Creative Mathematics, ON-WORDS: The Game of Word Structures, ON-SETS: The Game of Set Theory, QUERIES 'N THEORIES: The Game of Science and Language, and The POE Game.) No special equipment of any kind is required to play these games over the phone; all that the players need is pencil and paper. Also included in the weekly tournament are a series of interscholastic classroom matches that are scheduled between classes that each have six teams enrolled in the tournament. In these classroom matches each of the members of one team from a class are scheduled to call each of the members of one of the teams from the other class. Team members are free to call as many of the members of the entire tournament as they wish thereafter and play as many matches as they wish during the week.

Reports of the results of matches are forwarded to the tournament staff by the school messenger service or by the local bank messenger service on Mondays; these are summarized and the members of the highest scoring team for the week are invited to appear on the weekly television program that is taped each Thursday as part of the tournament. The captain of the highest scoring team is specially recognized as the THINKER OF THE WEEK in the tournament. The highest scoring member of each team is selected each week to serve as captain of the team the following week. The class that has the highest cumulative total number of points in the tournament for the prior four weeks is also recognized specially with a HIGH CLASS THINKERS award. There is also an award for the highest scoring of the six teams in each class each week. The awards are certificates that are presented to each member of the group. The THINKER OF THE WEEK and the HIGH CLASS THINKERS certificates are printed in the local newspaper each week through the support of local organizations.

Participation in the Community Thinkers' Tournament is open free of charge to anyone in the community who wishes to join. For those who are unfamiliar with the games that are played, there is an introduction to one of the games each day of the week at 5:00 on the local cable television station. Newcomers can also get started by phoning any one of the participants listed on the weekly scoreboard that is posted on the bulletin board at all branch offices of the local bank. Any five enrolled persons who are not members of a classroom team may form a team to enter the team play.

The experience to date in the Ann Arbor and Watts communities suggests that there is an interest in participating in such tournaments waiting to be served in perhaps a wide variety of communities throughout the nation. The two in which seemingly successful efforts are evolving are certainly widely different types of communities.

In those communities that develop a Community Thinkers' Telephone Tournament along with the classroom and computer-aided instructional gaming components, formal instruction in the schools will be supplemented by educational experiences to which the communications resources of other community institutions (banks, schools, newspapers, radio, television, and other) will be able to make significant contributions. The combination that forms the entire Community Thinkers' Tournament provides a vehicle to elicit community cooperation in forwarding such educational objectives of mutual interest.

COMPUTER-AIDED INSTRUCTIONAL GAMING BY PHONE

When the computer-aided instructional gaming system is completed, mounted, and ready to go, any learner in the local telephone area will be able to call in free of charge and engage a computer in an instructional game. The learner will specify what subject and the game level in that subject that he or she is interested in pursuing. The computer will take over from there: select the game, the appropriate level, the resources available, and set the goal to begin play. The computer will be programmed to play, not as a good player, but rather as a good teacher. It will make moves in such a way as to confront the learner with a new idea each time that learner plays. It will seek to provide information that will enable the learner to master that idea. All of the computer's assistance will be communicated to the learner in the Froggie voice of its electronically-generated audio signals, and all that the learner will need to participate is pencil and paper and an interest in learning. Experience indicates that this kind of instructional program can be a powerful stimulant to enhance learning achievement.

The computer component of the Community Thinkers' Tournament will add a dimension to the existing learning networks in the communities involved. In Ann Arbor it will deepen and enhance the quality of thinking involved in the classroom tournaments and the Community Thinkers' Tournament. In Flint it will enrich the intellectual menu available on the existing computer-aided learning system in the schools. Further, it will similarly extend the instructional gaming in the classroom and Community Thinkers' Tournament that is in process of getting started in the Flint area. The set of activities that will form the Flint Community Thinkers' Tournament will also provide a focus for involving the Flint campus of the University of Michigan more actively in local educational concerns in the Flint area. The Flint Community Thinkers' Tournament will be administered from the Curriculum Laboratory in the Education Department of the University under the direction of Professor Carl Rinne. When the software and other necessary aspects of the computer-aided instructional gaming system are completed, they can be made available to enrich the programs in other communities that have various aspects of the Community Thinkers' Tournaments; for example, in Detroit where instructional gaming tournaments are being introduced in Middle School classrooms throughout the city and a new Science museum is being constructed that would be an ideal institutional setting from which to operate a Community Thinkers' Tournament; in other southeast

Michigan communities that are now participating in the Michigan Academic Games League; in the Watts area of Los Angeles where a modified version of the Community Thinkers' Tournament is now operating out of the Kedren Community Mental Health Center; in New Orleans that has what is probably the most extensive and active interscholastic instructional gaming league in the country involving these games dealing with fundamental reasoning skills; and in the growing number of communities throughout the nation that are becoming interested in the community education movement (the Community Thinkers' Tournament would be a superb and highly cost-effective program to undertake as part of their over-all effort). In all cases, instructional gaming programs that involve fundamental reasoning skills in logic, mathematics, scientific method, and language structure will constitute the instructional method and intellectual emphasis of this effort. The computer-aided instructional gaming component will accelerate the introduction of additional and more complex ideas into these instructional efforts, enriching the menu available for learners.

Once an operating demonstration model of a Community Thinkers' Tournament is up and running, it will be a relatively trivial extension to bring up a version of it in any other interested community. The cost-effectiveness is likely to make it most attractive; for a modest capital investment and miniscule subsequent operating expenses, it will be possible to bring up a dedicated, time-sharing minicomputer configuration with 64 ports operating simultaneously, with home telephones operating as terminals. This automatic learning system can be available over the phone free of charge 24 hours a day to any interested learner in the community that has mounted it. Although the demonstration model in Ann Arbor and Flint will focus on mathematics, subsequent instructional programs will include material on logic, language structure, and scientific reasoning that can be coordinated with studies in those subjects in the local schools. Because the distribution of the instructional programs to learners will be so direct and inexpensive, extraordinary care and diligence can afford to be devoted to the preparation of the instructional sequences to be used in the program. The difficult task of devising the method for doing these instructional gaming sequences has already been accomplished; during the past decade and a half, effective instructional games for each of the fundamental intellectual skills have been devised and tested; and the computer programming for the instructional sequences in mathematics and for many of the sequences in that subject and example sequences in other subjects has already been done. What remains is development of a more complete library of the instructional sequences and adaptations of the computer program to handle the other subjects.

The communications technology involved in the Community Thinkers' Tournament is an intricate and sophisticated blend of existing capabilities of computers, instructional gaming, telephone systems, messenger services, coding, newspapers and other written publications, and television. The system that has been devised for linking the computer managed instructional program to ordinary dial phones as terminals is a new innovation; others all require touch-tone phones. To reach the audiences intended for this project, it is crucial that delivery be possible to ordinary dial phones. The ultimate version of the system will, of course, serve both.

CONCLUDING REMARKS

The Community Thinkers' Tournament described here is an extension of existing practices, but not that merely; it involves nothing less than the creation of a new educational institution designed to deal with the very intellectual skills that can best be handled in the manner proposed -- these, fortuitously, ones general and fundamental to most other educational achievement. A Community Thinkers' Tournament is an extraordinarily inexpensive and innovative educational institution beamed directly at all interested learners in the community -- with the potentiality of being replicated in every county throughout the nation. Perhaps it is not too much to hope that the Ann Arbor Community Thinkers' Tournament will prove to be only the first of many which will emerge throughout the world, wherever matters of the mind are taken seriously -- and playfully.

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